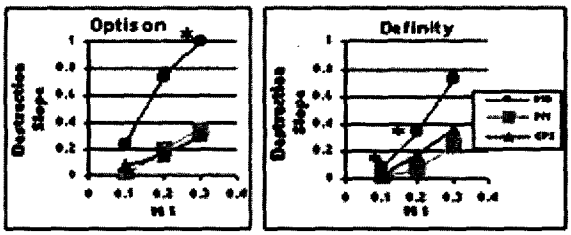
1043-28 **The Effect of Low Mechanical Index Pulse Sequencing Schemes Which Use Amplitude Versus Polarity Variation on Microbubble Destruction Rates**

Feng Xie, Thomas R. Porter, Carolin Sonne, Joseph R. Oberdorfer, University of Nebraska Medical Center, Omaha, NE

Background: Different pulse sequence schemes (PSS) have been developed for real time non-destructive myocardial perfusion imaging and intravenous microbubbles (MB). These include alternating polarity (PID), alternating amplitude (PM), and both alternating polarity and amplitude (CPS). Although these should have a similar effect on MB when used at the same mechanical index (MI), differences in averaged pulse amplitude as well as shell composition of MB may alter the threshold MI where destruction occurs. To test this, we injected either albumin coated (Optison) or lipid encapsulated (Definity) MB into a recirculating tissue phantom (attenuation 0.49 db/cm/MHz). MB destruction slopes were determined at transducer standoffs of three and nine centimeters. PID (ATL), PM (Agilent) and CPS (Acuson) at 1.5-1.7 MHz frequency and frame rates of 25 Hz were tested at an MI of 0.1, 0.2 and 0.3. **Results:** *=p<0.05 PID compared to PM and CPS at same MI. Initial contrast enhancement was equal for both MB agents at each standoff. However, PID had a lower threshold for MB destruction with both Optison and Definity (Graph). Amplitude varying PSS (PM and CPS) did not destroy Optison until 0.2 MI, and Definity until 0.3 MI. **Conclusion:** At the same MI, differences in PSS significantly affect MB destruction rates. PSS that use alternating amplitude are less destructive and therefore can be used at a higher MI setting than PSS that utilize alternating polarity.



1043-29 **Safety of New Contrast Agent, Sonazoid, for Contrast-Enhanced Myocardial Perfusion Echocardiography During Dipyridamole Stress Test**

Christine Whitman, Jeanne Drinko, Xiao-Fang Xu, Kathy Morris, James D. Thomas, Cleveland Clinic Foundation, Cleveland, OH

Background: Limited data is available in safety of Sonazoid™ (Amersham), which contains stabilized perfluorocarbon microbubble. The aim of study is to summarize the safety of Sonazoid for the assessment of myocardial perfusion during contrast enhanced dipyridamole stress echocardiography. **Methods**: Triggered replenishment or Ultraharmonic imaging (TRI or UH) (Philip HDI 5000 and Sonos 5500) was performed on 62 patients (59 ± 13 years old; 43 males) with suspected coronary artery disease during dipyridamole stress test. Sonazoid was infused continuously (IV; 0.01 to 0.02 ul/kg/min) with mechanical index of 1.3-1.6 for destruction and 0.3-1.5 for imaging respectively. A full safety evaluation was performed. **Results**: No neurological deficits or other abnormalities were demonstrated from complete physical examination 24 hrs after the infusion. No significant arrhythmia was detected during the entire study. Table summarized the data of ventricular ectopics (PVC's) occurrence.

	Rest (n=35)	Stress (n=35)
Without contrast (PVC/min)	0.66±3	na
Contrast infusion (MI 0.3-0.5) (PVC/min)	0.09±0.4	0.04±0.1
Contrast + triggering (PVC/min)	0.09±0.4	0.04±0.1
Contrast destruction (PVC's/Beats of flash)	51/1079	19/1059

All variables are expressed as mean ± Σ; MI 1.3 to 1.6 was used for bubble destruction;

No significant differences were demonstrated in cardiac enzymes, renal function, liver function, coagulation profile before, 15 mins and 24 hrs after the stress test.
Conclusions: This new contrast agent was well tolerated and safe in patients with suspected coronary artery disease. Ventricular ectopics occurred very infrequently in response to bubble destruction. No significant arrhythmia was detected.

1043-30 **Intermediate Mechanical Index Triggered Replenishment (Every Cardiac Cycle) Myocardial Contrast Echocardiography: A New and Accurate Method for the Assessment of Coronary Artery Disease**

Paramjit Jeetley, Michael Hickman, Roxy Senior, Northwick Park Hospital, Harrow, United Kingdom

Background: High mechanical index (MI) myocardial contrast echo (MCE) may cause myocardial capillary damage, requires prolonged imaging times, and in most cases requires off-line background subtraction to adequately assess myocardial blood flow (MBF). Low MI imaging may lead to reduced sensitivity for the detection of microbubbles and usually requires higher infusion rates. Experimental studies using Sonazoid (Amersham Nycomed Imaging) have shown that intermediate MI imaging does not destroy microbubbles and therefore requires shorter imaging times to assess microbubble replenishment following a high MI pulse. Background noise is also reduced allowing on-line assessment of images without the need for background subtraction. We hypothesised that this method will accurately detect significant CAD.
Methods: Consecutive patients with suspected CAD, who were scheduled for coronary angiography, underwent MCE with intermediate MI (0.5) triggered imaging (1:1 cardiac cycle) following high MI pulsed bubble destruction. Images were obtained at rest and during dipyridamole stress. End-systolic frames were assessed for myocardial perfusion according to a 16 segment model. The results were compared with findings at coronary angiography.
Results: Of the 41 patients, 35 had CAD (>50% coronary artery stenosis). Of these, 30 (86%) demonstrated perfusion defects on MCE. Sensitivity for the detection of >75% CAD was 90%. Of the remaining 6 patients studied with <50% coronary artery stenosis, 3 demonstrated abnormal perfusion defects on MCE. Only 1 of these patients had completely normal coronary arteries. Accuracy of MCE to detect CAD (>50% coronary artery stenosis) was 81%.
Conclusion: MCE with dipyridamole stress using intermediate MI and triggered replenishment images is accurate for the detection of CAD.

1043-45 **Correlation of Coronary Flow Reserve Measured by Myocardial Contrast Echocardiography and Coronary Angiography**

Serena M. Bierig Karen Klatte, Morton Kern, Arthur J. Labovitz, Saint Louis University, Saint Louis, MO

Introduction: Myocardial contrast echocardiography (MCE) has emerged as a reliable method of assessing myocardial perfusion. Few studies have looked at invasively measured coronary flow reserve and compared it to non-invasively measured MCE. The aim of this study was to simultaneously evaluate coronary flow reserve by cardiac flow wire and MCE. Methods: Ten normal patients undergoing routine cardiac catheterization were evaluated for coronary flow reserve using baseline Doppler flow wire measurements and adenosine induced hyperemia. Myocardial perfusion was obtained by bolus then infusion of OptisonTM at rest and peak hyperemia. Real-time and triggered echocardiographic perfusion images were digitized and analyzed off-line. MCE uptake was analyzed and curve fit to obtain flow and velocity by using y=A (1-expbt). Twelve myocardial segments in the apical four and two chamber views were analyzed with correlation made to the respective coronary territory. Results: Two patients had nondiagnostic images for post test analysis. The left anterior descending was measured in 7 patients, with 1 patients having circumflex CFR interrogation. Doppler flow wire measurements of CFR ranged from 2.2-4.6 in all 8 normal arteries. MCE CFR ranged from 2.2-4.2. Infusion administration and Real-time imaging resulted in the most accurate assessment of CFR by MCE. Conclusion: MCE can accurately identify normal CFR in normal patients when compared to invasively measured Doppler wire assessment.

1043-46 **Accuracy of Quantitative Assessment of Collateral Blood Flow Estimated by Real-Time Myocardial Contrast Echocardiography: Comparison With Microsphere Method**

Ayako Miki, Kasumi Masuda, Kentaro Otani, Juri Okazaki, Hideo Hirayama, Tsutomu Toshida, Akiko Iwata, Toshihiko Asanuma, Fuminobu Ishikura, Shintaro Beppu, Osaka University, Suita, Japan

Background: Assessment of residual collateral-derived myocardial blood flow (MBF) is important to protect against myocardial ischemia following acute coronary occlusion.
Purpose: The aim of this study was to reveal the accuracy of MBF by collateral vessels estimated by real-time myocardial contrast echocardiography (MCE) by comparing with microshere derived MBF.
Methods: Short axis view of the left ventricle was recorded using real-time MCE by Sequoia 512 (SIEMENS) during infusion of Definity® in 6 open-chest dogs. The left circumflex coronary artery (LCx) was completely occluded for 30 seconds and the contrast echo video intensity were evaluated in the control and ischemic areas. The ischemic area was divided into 3 zones (1 Core and 2 Border zones). The replenishment curve in each region was fitted to an exponential function : $y = A(1-e^{-\beta t})$. MCE derived MBF(A× β) at the ischemic area was normalized as %MBF of contraol area. Microsphere(15μm) were injected from left auricle at 30 seconds after LCx occlusion and %MBF of the area at risk was calculated from the postmortem specimen.
Results: Real time MCE revealed definite recruitment by collateral in the area at risk after occlusion. The video intensity at the core zone was significantly lower than those at the border zone (27.2±14.9 vs. 42.3±13.5, p<0.001). The %MBF by MCE correlated with that by microsphere method (r=0.84, p<0.005). %A did not correlate with %MBF by microsphere method.
Conclusion: Real-time MCE is a useful non-invasive method to evaluate the collateral-derived residual MBF within area at risk, which can be an accurate index of protection against myocardial ischemia following acute coronary occlusion.

1043-47 **Characteristics of Myocardial Contrast Echocardiography, Coronary Flow Reserve, and Coronary Flow Velocity Pattern in Patients With Acute Myocardial Infarction**

Tomoko Tani, Kazuaki Tanabe, Miwa Ono, Motoaki Ibuki, Minako Katayama, Koichi Tamita, Kenji Yamabe, Atsushi Yamamuro, Kunihiko Nagai, Kenichi Shiratori, Shigefumi Morioka, Kobe General Hospital, Kobe, Japan

Myocardial contrast echocardiography (MCE) and coronary flow reserve (CFR) in infarct-related artery after acute myocardial infarction (AMI) has been reported to be useful in assessing myocardial viability. Previous study using a Doppler guide wire has reported that coronary flow velocity pattern (CF) with a rapid diastolic deceleration time (DDT) immediately after percutaneous coronary intervention implies the advanced microvascu-